

CLAIMS:

1. A method for immobilizing a polynucleotide probe comprising the steps of: combining the probe with a polynucleotide target stably associated with a surface of a solid support, wherein at least one of the probe and target is double-stranded comprising complementary strands, and the other is single-stranded having complementarity with one of the complementary strands, under conditions wherein the probe and target hybridize and the probe is thereby immobilized.

2. A method according to claim 1, further comprising the step of detecting specific hybridization of the probe and the target.

3. A method according to claim 1, further comprising the step of ^{releasing} ~~isolating~~ the immobilized probe.

4. A method according to claim 1, further comprising the step of amplifying the immobilized probe.

5. A method according to claim 1, further comprising the step of amplifying the immobilized probe and then detecting resultant amplified probe.

6. A method according to claim 1, further comprising the steps of releasing and amplifying the probe to produce a labeled, amplified double-stranded probe, hybridizing the labeled probe to a target polynucleotide to immobilize the labeled probe and detecting the labeled probe.

7. A method according to claim 1, further comprising the steps of releasing and amplifying the probe to produce a labeled, amplified double-stranded probe, hybridizing the labeled probe to a target polynucleotide to immobilize the labeled probe and detecting the labeled probe, wherein the probe is double-stranded and target is single-stranded.

8. A method according to claim 1, wherein the double-stranded probe or target comprises

noncovalently linked complementary strands.

9. A method according to claim 1, wherein the double-stranded probe or target comprises covalently linked complementary strands.

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10. A method according to claim 1, wherein the probe comprises a detectable label.

11. A method according to claim 1, wherein the target and solid support are of a microarray.

10 12. A method according to claim 1, wherein the conditions include an amount of a metal ion sufficient to enhance hybridization of the target and probe.

15 13. A method according to claim 1, wherein the conditions include an amount of a metal ion sufficient to enhance hybridization of the target and probe, wherein the metal ion is selected from the group consisting of Zn^{++} , Ni^{++} , Ca^{++} , Fe^{++} , Fe^{+++} , Mg^{++} , K^{+} , Co^{++} and Co^{+++} .

14. A method according to claim 1, wherein the solid support comprises a polycationic surface.

20 15. A method for immobilizing and detecting a polynucleotide probe, comprising the steps of:

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contacting a polynucleotide target which is stably associated with a surface of a solid support, with a polynucleotide probe which is double-stranded; and

detecting specific hybridization of the probe to the target.

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16. A method according to claim 15, wherein the probe comprises noncovalently linked complementary strands.

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17. A method according to claim 15, wherein the probe comprises covalently linked complementary strands.

18. A method according to claim 15, wherein the probe comprises covalently linked complementary strands and is of hairpin structure.

5 19. A method according to claim 15, wherein the probe comprises covalently linked complementary strands, linked through a first coupling moiety on one strand and a second coupling moiety on the second strand.

10 20. A method according to claim 15, wherein the probe comprises covalently linked complementary strands, linked through a first coupling moiety on one strand and a second coupling moiety on the second strand, wherein

(a) the first coupling moiety is an alkylamine and the second coupling moiety is selected from an active ester, amide, imine, aldehyde, bromoacetamide and thiocyanate; or

(b) the first coupling moiety is a thiol and the second coupling moiety is selected from a disulfide, maleimides and bromoacetamides.

15 21. A method according to claim 15, wherein the probe comprises a detectable label.

22. A method according to claim 15, wherein the target is single-stranded.

20 23. A method according to claim 15, wherein the target and solid support are of a microarray.

24. A method according to claim 15, wherein the solid support comprises a polycationic surface.